

**WE CLAIM:**

- 1                   1.       A method for identifying a compound that modulates cell cycle  
2   arrest, the method comprising the steps of:  
3                   (i) contacting a cell comprising a target polypeptide selected from the  
4   group consisting of BRCA-1-Associated Protein-1 (BAP-1), Nuclear Protein 95 (NP95),  
5   Fanconi anemia group A protein (FANCA), DEAD/H box polypeptide 9 (DDX9),  
6   insulin-like growth factor 1 receptor (IGF1R), ubiquitin-conjugating enzyme E2 variant 1  
7   (UBE2V1), aldehyde dehydrogenase, pyruvate kinase, glucose-6-phosphate  
8   dehydrogenase, HCDR-3, DEAD/H box polypeptide 21 (DDX21), serine threonine  
9   kinase 15 (ARK2), transmembrane 4 superfamily member 1, or ERCC1, or fragment  
10   thereof with the compound, the target polypeptide encoded by a nucleic acid that  
11   hybridizes under stringent conditions to a nucleic acid encoding a polypeptide having an  
12   amino acid sequence a sequence selected from the group consisting of SEQ ID NO:2, 4,  
13   6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, and 28; and  
14                   (ii) determining the chemical or phenotypic effect of the compound upon  
15   the cell comprising the target polypeptide or fragment thereof, thereby identifying a  
16   compound that modulates cell cycle arrest.
- 1                   2.       The method of claim 1, wherein the chemical or phenotypic effect  
2   is determined by measuring an activity selected from the group consisting of: helicase  
3   activity, receptor tyrosine kinase activity, ubiquitination, ligase, ubiquitin hydrolase  
4   activity, ubiquitin ligase activity, receptor binding activity, receptor cross-linking  
5   activity, protease, and endonuclease.
- 1                   3.       The method of claim 1, wherein the chemical or phenotypic effect  
2   is determined by measuring cellular proliferation.
- 1                   4.       The method of claim 3, wherein the cell cycle arrest is measured by  
2   assaying DNA synthesis or fluorescent marker level.
- 1                   5.       The method of claim 4, wherein DNA synthesis is measured by <sup>3</sup>H  
2   thymidine incorporation, BrdU incorporation, or Hoescht staining.
- 1                   6.       The method of claim 4, wherein the fluorescent marker is selected  
2   from the group consisting of a cell tracker dye or green fluorescent protein.

- 1                    7.        The method of claim 1, wherein modulation is activation of cell  
2    cycle arrest.
- 1                    8.        The method of claim 1, wherein modulation is activation of cancer  
2    cell cycle arrest.
- 1                    9.        The method of claim 1, wherein the host cell is a cancer cell.
- 1                    10.      The method of claim 9, wherein the cancer cell is a breast, prostate,  
2    colon, or lung cancer cell.
- 1                    11.      The method of claim 9, wherein the cancer cell is a transformed  
2    cell line.
- 1                    12.      The method of claim 11, wherein the transformed cell line is PC3,  
2    H1299, MDA-MB-231, MCF7, A549, or HeLa.
- 1                    13.      The method of claim 9, wherein the cancer cell is p53 null or  
2    mutant.
- 1                    14.      The method of claim 9, wherein the cancer cell is p53 wild-type.
- 1                    15.      The method of claim 1, wherein the polypeptide is recombinant.
- 1                    16.      The method of claim 1, wherein the polypeptide is encoded by a  
2    nucleic acid comprising a sequence of SEQ ID NO:1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23,  
3    25, or 27.
- 1                    17.      The method of claim 1, wherein the compound is an antibody.
- 1                    18.      The method of claim 1, wherein the compound is an antisense  
2    molecule.
- 1                    19.      The method of claim 1, wherein the compound is an RNAi  
2    molecule.
- 1                    20.      The method of claim 1, wherein the compound is a small organic  
2    molecule.

- 1                   21.     The method of claim 1, wherein the compound is a peptide.
- 1                   22.     The method of claim 21, wherein the peptide is circular.
- 1                   23.     A method for identifying a compound that modulates cell cycle  
2 arrest, the method comprising the steps of:  
3                   (i) contacting the compound with a target polypeptide selected from the  
4 group consisting of BRCA-1-Associated Protein-1 (BAP-1), Nuclear Protein 95 (NP95),  
5 Fanconi anemia group A protein (FANCA), DEAD/H box polypeptide 9 (DDX9),  
6 insulin-like growth factor 1 receptor (IGF1R), ubiquitin-conjugating enzyme E2 variant 1  
7 (UBE2V1), aldehyde dehydrogenase, pyruvate kinase, glucose-6-phosphate  
8 dehydrogenase, HCDR-3, DEAD/H box polypeptide 21 (DDX21), serine threonine  
9 kinase 15 (ARK2), transmembrane 4 superfamily member 1, or ERCC1, or fragment  
10 thereof, the target polypeptide encoded by a nucleic acid that hybridizes under stringent  
11 conditions to a nucleic acid encoding a polypeptide having an amino acid sequence a  
12 sequence selected from the group consisting of SEQ ID NO:2, 4, 6, 8, 10, 12, 14, 16, 18,  
13 20, 22, 24, 26, and 28;  
14                   (ii) determining the physical effect of the compound upon the target  
15 polypeptide; and  
16                   (iii) determining the chemical or phenotypic effect of the compound upon  
17 a cell comprising the target polypeptide or fragment thereof, thereby identifying a  
18 compound that modulates cell cycle arrest.
- 1                   24.     A method of modulating cell cycle arrest in a subject, the method  
2 comprising the step of administering to the subject a therapeutically effective amount of a  
3 compound identified using the method of claim 1.
- 1                   25.     The method of claim 24, wherein the subject is a human.
- 1                   26.     The method of claim 25, wherein the subject has cancer.
- 1                   27.     The method of claim 24, wherein the compound is an antibody.
- 1                   28.     The method of claim 24, wherein the compound is an antisense  
2 molecule.

- 1                    29.     The method of claim 24, wherein the compound is an RNAi  
2     molecule.
- 1                    30.     The method of claim 24, wherein the compound is a small organic  
2     molecule.
- 1                    31.     The method of claim 24, wherein the compound is a peptide.
- 1                    32.     The method of claim 31, wherein the peptide is circular.
- 1                    33.     The method of claim 24, wherein the compound inhibits cancer cell  
2     proliferation.
- 1                    34.     A method of modulating cell cycle arrests in a subject, the method  
2     comprising the step of administering to the subject a therapeutically effective amount of a  
3     target polypeptide selected from the group consisting of BRCA-1-Associated Protein-1  
4     (BAP-1), Nuclear Protein 95 (NP95), Fanconi anemia group A protein (FANCA),  
5     DEAD/H box polypeptide 9 (DDX9), insulin-like growth factor 1 receptor (IGF1R),  
6     ubiquitin-conjugating enzyme E2 variant 1 (UBE2V1), aldehyde dehydrogenase,  
7     pyruvate kinase, glucose-6-phosphate dehydrogenase, HCDR-3, DEAD/H box  
8     polypeptide 21 (DDX21), serine threonine kinase 15 (ARK2), transmembrane 4  
9     superfamily member 1, or ERCC1, or fragment thereof, the target polypeptide encoded by  
10    a nucleic acid that hybridizes under stringent conditions to a nucleic acid encoding a  
11    polypeptide having an amino acid sequence a sequence selected from the group consisting  
12    of SEQ ID NO:2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, and 28.
- 1                    35.     A method of modulating cell cycle arrest in a subject, the method  
2     comprising the step of administering to the subject a therapeutically effective amount of a  
3     nucleic acid encoding a target polypeptide selected from the group consisting of BRCA-  
4     1-Associated Protein-1 (BAP-1), Nuclear Protein 95 (NP95), Fanconi anemia group A  
5     protein (FANCA), DEAD/H box polypeptide 9 (DDX9), insulin-like growth factor 1  
6     receptor (IGF1R), ubiquitin-conjugating enzyme E2 variant 1 (UBE2V1), aldehyde  
7     dehydrogenase, pyruvate kinase, glucose-6-phosphate dehydrogenase, HCDR-3,  
8     DEAD/H box polypeptide 21 (DDX21), serine threonine kinase 15 (ARK2),  
9     transmembrane 4 superfamily member 1, or ERCC1, or fragment thereof, the nucleic

- 10 acid hybridizing under stringent conditions to a nucleic acid encoding a polypeptide
- 11 having an amino acid sequence a sequence selected from the group consisting of SEQ ID
- 12 NO:2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26 and 28.